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March 28, 1980

Mr. Bernie Kute
National Semiconductor Corporation
2900 Semiconductor Drive
Santa Clara, California 95050

Re: Bally Manufacturing vs. D. Gottlieb & Co.
Case No. 78G 2246 Our File No. 12684 WV/WW

Dear Mr. Kute:

Pursuant to instructions of counsel, we are enclosing herewith the original transcript of your deposition taken March 6, 1980, in the above matter.

Please read the transcript for accuracy, and sign it, before any notary, where indicated on page 76. If you should have any corrections, please indicate them on the enclosed yellow sheets of paper; the reporter will make the actual changes in the deposition.

We will very much appreciate receiving the signed deposition back in our office by April 30, 1980, so that we may file it with the court.

Thank you.

Yours very truly,

OBUJEN & McCUTCHEON, INC.

by: Martha A. Press

encls
cc: Wayne M. Harding, Esq.
Jerold B. Schnayer, Esq.

M G OBUJEN
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June 27, 1980

ARNOLD, WHITE & DURKEE, ESQS.
ATTORNEYS AT LAW
2100 Transco Tower
Houston, Texas 77056

Attention: Wayne M. Harding, Esq.

Re: BALLY V GOTTLIEB, NO. 78C 2246, Our File No. 12684 WV.

Dear Mr. Harding:

Bernie Kute has read his deposition, taken March 6, 1980, in the above matter, making the following changes or corrections:

Page	Line	Change or Correction
3	10	Change "Delaus" to "Hayloft."
6	12	" "Sam Sowin, S-o-w-i-n" to "Dan Sowin, S-o-w-i-n."
10	11	" "name" to "game."
23	7 & 8	" "in bads, bauds" to "and bads, bods."
26	8	" "15 12 by eight." to "512 by 8."
30	20	" "and eight." to "and gate."
"	23	" "loaded" to "closed."
33	4	" "fifty" to "fifteen."
36	9	" "volt nap" to "volt lamp."
39	5	" "It did in that order" to "It did. In that order too."
40	13	Change "to the double" to "to the number."
46	3	" "slag outputs" to "flag outputs."
53	13&14	" "NAR5" to "NIR5."
54	14	" " " "
56	23	" "BCD27-segment" to "BCD to 7 segment."
61	13	" "M16" to "IMP 16."

These changes and corrections have been made to the deposition-original by our reporter-notary and it will now be filed with the court.

Yours very truly,

OBUJEN & McCUTCHEON, INC.

Helen S. Preshaw

by: Helen S. Preshaw

HSP:mmi

cc: Jerold B. Schnayer, Esq.

James Sheridan, Esq.

IN THE UNITED STATES DISTRICT COURT

FOR THE NORTHERN DISTRICT OF ILLINOIS - EASTERN DIVISION

BALLY MANUFACTURING CORPORATION,

Plaintiff,

vs.

D. GOTTLIEB & CO., a corporation, and WILLIAMS ELECTRONICS, INC., a corporation, and ROCKWELL INTERNATIONAL CORPORATION, a corporation,

Defendants.

No. 78G 2246

BE IT REMEMBERED that, pursuant to notice and subpoena and on Thursday, March 6, 1980, commencing at the hour of 10:00 A.M., at the NATIONAL SEMICONDUCTOR CORPORATION, 2900 Semiconductor Drive, Santa Clara, California, before me, WENDY LEE VAN MEERBEKE, a Certified Shorthand Reporter, License No. 3676, and a Notary Public in and for the County of Orange, State of California, personally appeared

BERNIE KUTE

who was called as a witness by plaintiff.

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I N D E X

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A P P E A R A N C E S

For plaintiff:	FITCH, EVEN, TABIN, FLANNERY & WELSH, ESQS., BY: JEROLD B. SCHNAYER, ESQ., AND DONALD L. WELSH, ESQ., 135 South LaSalle Street Suite 900 Chicago, Illinois 60603
For defendants D. Gottlieb & Co., and Rockwell International:	ARNOLD, WHITE & DURKEE, ESQS., BY: WAYNE M. HARDING, ESQ., 2100 Transco Tower Houston, Texas 77056
For National Semiconductor:	JAMES SHERIDAN, ESQ., AND MICHAEL SCHERRARD, ESQ., 2900 Semiconductor Drive Santa Clara, California 95051

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BERNIE KUTE

having first been duly sworn by the Notary Public to tell the truth, the whole truth, and nothing but the truth, was thereupon examined and testified as follows:

EXAMINATION BY MR. HARDING

MR. HARDING: Q Would you state your name and address, please?

THE WITNESS: A Bernie Kute, 2860 Hay Loft Way, Morgan Hill.

MR. SCHNAYER: How do you spell the last name?

THE WITNESS: K-u-t-e.

(Whereupon, the document identified as a Notice of Deposition was marked by the Reporter as GD235 for identification.)

MR. HARDING: This deposition is being taken pursuant to a Notice of Deposition which I have marked as GD235 and supboenaes. I'd like to request that counsel for National can see if that is the notice that you received in preparation for this deposition.

MR. SHERIDAN: Yes, it is.

MR. HARDING: Were you served with subpoenaes?

MR. SHERIDAN: Yes.

MR. HARDING: Did the subpoena request certain information be brought to this deposition?

MR. SHERIDAN: Yes.

MR. HARDING: Did you bring any information?

MR. SHERIDAN: These documents.

MR. HARDING: Okay. And by "these documents," he is referring to the documents I now have. I would like to mark the documents at this time which correspond with GD designations. We have already assigned copies of those documents. The first set of documents are six sheets of what purports to be National Semiconductor size B drawings. That will be GD225.

(Whereupon, the six-page document previously identified by Mr. Harding was marked by the Reporter as Exhibit GD225 for identification.)

MR. HARDING: The next document would appear to be an eight-page flow diagram with the word "Initialization" in the upper right-hand corner. I'd like to mark it as GD226.

(Whereupon, the eight-page document previously identified by Mr. Harding was marked by the Reporter as Exhibit GD226 for identification.)

MR. HARDING: The next document appears to be a multi page computer printout bearing the designation "National Semiconductor PACE" with a hand annotated date of 7-6-75. We will mark that as GD227.

(Whereupon, the computer printout previously identified by Mr. Harding was marked by the Reporter as Exhibit GD227 for identification.)

MR. HARDING: The last document appears to be a single sheet marketing brochure labeled "United Games Presents OXO." I'd like to mark that as GD228.

(Whereupon, the one-page marketing brochure entitled "United Games Presents OXO" was marked by the Reporter as Exhibit GD228 for identification.)

MR. HARDING: While we are marking documents, I'd like to mark as GD232 a single-page size C circuits schematic designated "Printed Board PACE CPUD Version."

(Whereupon, the document previously identified by Mr. Harding was marked by the Reporter as Exhibit GD232 for identification.)

MR. HARDING: As GD233 we have a single-page circuit schematic size C designated "ASS'Y Printed Wiring Board PACE Application CPU D Version."

(Whereupon, the document previously identified by Mr. Harding was marked by the Reporter as Exhibit GD233 for identification.)

MR. HARDING: Finally GD234, size D single-page drawing designated "Logic Diagram PACE Application CPU card D Version."

(Whereupon, the document previously identified by Mr. Harding was marked by the Reporter as Exhibit GD234 for identification.)

MR. SCHNAYER: Mr. Harding, I note there were certain documents we were given copies of. One appeared to have the number GD229. The other documents were GD300, and the other of the documents had the number GD231, so it was 229 to 231. I ask you do you intend to mark these as exhibits?

MR. HARDING: I cannot find my copies. I would mark your copies as exhibits if that's all right.

MR. SCHNAYER: Sure. Give me a second.

MR. HARDING: We can do that in a minute.

Q Mr. Kute, are you employed?

THE WITNESS: A Am I employed?

Q Yes.

A Yes.

MR. SHERIDAN: Excuse me. May we go off the record?

MR. HARDING: Sure.

(Whereupon, a discussion was held off the record.)

MR. HARDING: A few more documents. Here is a two-page letter dated May 29, 1975, to Mr. Frank Johnson from ~~Sam Sowin, S-o-w-i-n~~ Dan Sowin S-O-WIN This will be GD229 and GD229.1.

(Whereupon, the two-page letter previously identified by Mr. Harding was marked by the Reporter as Exhibits GD229 and GD229.1 for identification.)

MR. HARDING: Here is a three-page document designated GD230, GD230.1, GD230.2 having attached on the front side what appears to be a calling card from Hamilton Avnet, A-v-n-e-t, Bette Larkin, B-e-t-t-e, L-a-r-k-i-n. That's folded over, stapled to the back side.

(Whereupon, the three-page document previously identified by Mr. Harding was marked by the Reporter as Exhibit GD230, GD230.1 and GD230.2 for identification.)

MR. HARDING: The last document is a three-page document which will be GD231, GD231.1 and GD231.2 entitled "List of Materials PACE Applications CPU Card, D Version."

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(Whereupon, the three-page document previously identified by Mr. Harding was marked by the Reporter as Exhibit GD231, GD231.1 and GD231.2 for identification.)

MR. HARDING: Mr. Sheridan, is Mr. Kute appearing here today on behalf of National Semiconductor to testify on these subject matters designated in the Notice of Deposition?

MR. SHERIDAN: That's right.

MR. HARDING: Do you intend to produce any other witnesses as designees in this subject matter?

MR. SHERIDAN: Yes. Keith Winter, K-e-i-t-h, W-i-n-t-e-r, and Milt Schwartz, M-i-l-t, S-c-h-w-a-r-t-z.

MR. HARDING: Off the record.

(Whereupon, a discussion was held off the record.)

MR. HARDING: Q With whom are you employed?

THE WITNESS: A. National Semiconductor.

Q. On or around 1975 were you employed by National Semiconductor?

A. Yes.

Q. Did you have any involvement in microprocessors at that time?

A. Yes.

Q. Were you involved in any projects that pertained to the application of microprocessor to games?

A. Yes.

Q. Can you identify one such project in that time frame?

A. The OXO game.

Q. What was the OXO game that you referred to?

A. It was a tic-tac-toe type pinball machine.

Q. Was that work done for any particular company or individual, to your recollection?

A. To the best of my knowledge, it was done for Frank Johnson, who I believe was with United Games.

MR. SCHNAYER: I object to the question. Lack of foundation. The witness has no first-hand knowledge about that.

MR. HARDING: Q. Do you know where United Games is located?

THE WITNESS: A. Somewhere in the northwest. I don't know exactly.

Q. Northwest United States?

A. Right.

Q. Do you know approximately when the development project for OXO commenced?

MR. SCHNAYER: Objection. Lack of foundation whether it was a development project, whether the witness has knowledge as to when it commenced.

MR. SHERIDAN: Go ahead and answer it.

THE WITNESS: The end of May, beginning of June is when we started.

MR. HARDING: Q. What is your recollection of any events that would trigger the end of May, June commencement date?

THE WITNESS: A. The dates on the drawings.

Q. Okay. What drawings are you referring to?

A. The schematics that Keith Winter and I prepared and

the flow charts.

Q. Can you identify those drawings now from the documents we have designated of record in this deposition?

A. The schematics are these, GD225.

Q. Okay. Any drawings in particular?

A. The whole set was done by us.

Q. And why do those drawings fix the date in May or June for the commencement of the project?

A. Because we had six weeks to do the job, and the dates on these drawings are between June 25th, July 16th.

Q. Why do you say you had six weeks to do the job?

A. That was the time frame we were given when we started the job.

Q. Who gave you this time frame?

A. The customer.

Q. Mr. Johnson?

A. Yes.

MR. SCHNAYER: Objection. Leading.

MR. HARDING: Q. Who, to your recollection, were involved in the project which lead to the OXO development?

THE WITNESS: A. From the engineering standpoint?

Q. We can begin there.

A. Okay. Keith Winter, Milt Schwartz and myself and Al Weisberger.

Q. Do you recall any particular responsibility that each of these individuals had in connection with that project?

A. Al Weisberger did the software, and the rest of us did pieces of the hardware and the debug.

MR. SCHNAYER: I would like to state an objection. Lack of foundation for the last question.

MR. HARDING: Q I'd like to refer you to GD229 and see if you have ever seen that document before today.

THE WITNESS: A No, I haven't.

Q Have you seen GD228 before today?

A Yes, I have.

Q What is that document, to your recollection?

A It was the brochure that Frank Johnson brought down when he picked up the machine. He said that's what his ~~name~~ game was going to be.

Q To your recollection, what was National's first step in this project?

MR. SCHNAYER: Objection. That question is vague to what you mean by "National's." What do you mean by the word "National's first step" and whether the witness has knowledge -- lack of foundation on the part of the witness if he has knowledge.

THE WITNESS: From the technical aspects of it we sat down to do flow charts and hardware to see what it would take to implement the game.

MR. HARDING: Q When you say "we," who was we to do the flow charts?

THE WITNESS: A We sat down with Al Weisberger, myself and Frank Johnson.

Q Were flow charts prepared?

MR. SCHNAYER: Objection. The question is leading.

THE WITNESS: Flow charts were prepared. They,

however, were modified during the making of the game. We did have flow charts.

MR. HARDING: Q I am handing you document GD226 and ask if you can identify that?

THE WITNESS: A This is the final flow chart of the game.

Q Do you know who prepared that document?

A I believe it was Al Weisberger.

Q Do you recognize his handwriting, or what is the basis for your belief?

A Only in that he was responsible for that part of the project.

MR. SCHNAYER: Late objection. Lack of foundation that the witness has any knowledge as to that document.

MR. HARDING: Q What involvement, if any, did you have in the preparation of flow charts?

THE WITNESS: A Very little. Just the basic overall structure of the game, not to the details that these have.

Q Did Mr. Johnson bring any hardware with him at all at the beginning of the project for use by National?

A Yes, he did.

Q What did he bring?

A He brought the play field with the switches mounted, the basic box stand, solenoids, ball kickers, play switch and the coin box.

Q And do you recall when he brought this equipment?

A Not the exact date. No.

Q Do you recall approximately?

A Early in June.

Q Was there any commission given to National and specifically in the group of individuals that you named in connection with the equipment that Mr. Johnson brought down?

MR. SCHNAYER: Objection. Lack of foundation.

THE WITNESS: I am not sure I understand the question.

MR. HARDING: Q Why did Mr. Johnson, to your knowledge, bring this equipment to you?

THE WITNESS: A In order for us to program up his game.

Q And can you be more specific on "program up his game"?

A Basically we agreed to develop the hardware and software to implement the game as he described it and as we had flow charted it.

Q Were there any particular circuit structures contemplated at the commencement of the project?

MR. SCHNAYER: Objection to the question as being vague as by whom and lack of foundation as to whether this witness has any first-hand knowledge of that. Also possibly hearsay.

THE WITNESS: In the beginning we decided we would do it with PACE.

MR. HARDING: Q Can you describe what PACE is?

THE WITNESS: A PACE is a one chip 16-bit microprocessor.

Q Was there any sort of an agreement as to whether

some sort of a microprocessor circuit would be utilized by National in the development?

MR. SCHNAYER: Objection to the question. Lack of foundation.

THE WITNESS: Absolutely. Our job in National had only to do with microprocessors. We were the microprocessor application group.

MR. HARDING: Q How did your group, to your knowledge, get involved in the development as opposed to some other group at National?

MR. SCHNAYER: Objection to the question. Lack of foundation as to whether this witness has first-hand knowledge of this group. Also possibly hearsay.

THE WITNESS: . Our group got involved in it because we were the responsible group to do -- for customer interface in microprocessors.

MR. HARDING: Q Do you have any knowledge of why the microprocessor applications group was selected to perform this job as compared to some other group at National?

THE WITNESS: A I am not sure I follow the question.

Q Who, if anybody, made a determination to use a microprocessor rather than say random logic as a controller for the game?

MR. SCHNAYER: Objection to the question as to whether this witness has first-hand knowledge as to who made the decision. Possibly hearsay.

THE WITNESS: I don't know who made that decision.

MR. HARDING: Q Do you know if a decision was made?

MR. SCHNAYER: Same objection.

THE WITNESS: Yes. I do know the decision was made.

MR. HARDING: Q How do you know that?

THE WITNESS: A. Because we did the job.

Q. Okay. Can you describe the play field in a little more detail, which you indicated Mr. Johnson supplied to your group?

A. It was just basically a flat board with various obstruction bumpers, one switch which was the center of the matrix, number two switch in the upper level of the board, and then a row of the other eight switches further down the play field.

Q. First of all, was there a game objective to this equipment?

MR. SCHNAYER: Objection to the question as lack of foundation this witness has any knowledge as to whether there was a game objective.

MR. HARDING: Q Do you understand what I mean by "game objective"?

THE WITNESS: A. No. I don't think I do.

Q. Do you know how the play of the game was intended to proceed when the project was completed?

MR. SCHNAYER: Objection to the question. Lack of foundation that this witness has personal knowledge with respect to that.

THE WITNESS: Okay. From the descriptions of Frank

Johnson and from working with him in developing flow charts and how we would go about doing it, yes, we had a --

MR. HARDING: Q Can you explain your understanding of how the play of the game was to proceed?

THE WITNESS: A Okay. There was a coin box. It would accept nickels, dimes and quarters. For every nickel's worth of coins put in the player was given one credit. He could put in up to 99 credits. I believe it was 99.

At that point he could hit as many -- hit the play buttons as many times as he wanted. Each time the play button was hit the credits would be decremented and the plays would be incremented.

Q Excuse me. Can you explain what you mean by play button?

A This button here on the front. (Indicating.)

MR. HARDING: The witness is referring to GD228.

Q Which button are you referring?

THE WITNESS: A The one between the ball plunger and the coin slot.

Q Did the equipment depicted in GD228 bear any relationship to the game play that you are presently describing?

A With the exception of the display boards in the back and the painting, it was a fairly good representation.

Q Okay. What board in the back are you referring to?

A The display of the tic-tac-toe format on it.

Q Okay. Can you proceed with your description?

A. Okay. The player would hit the play button for as many plays as he wanted to bet on this game or invest in this game.

Q. Would you please circle the play button on GD228 and indicate PB for play button?

A. (Witness indicates.)

Q. Would you continue?

A. When he had invested as many plays as he wanted, he would shoot the first ball. He is allowed three balls. The objective of the game was to get three corners diagonal, horizontal or vertical as in tic-tac-toe, the difference being that three corners was a win instead of having four corners.

Q. You mentioned earlier there was a row of eight switches, and now you are mentioning three corners. I don't understand.

A. I said there was a single switch up top. The number two switch, which is the center.

Q. Can you designate that on GD228?

A. It is marked. There is a two on it.

Q. All right. Would you circle it somehow and designate number two switch?

A. (The witness indicates.) Below that there was a row of eight switches which makes up nine switches, which correspond to the nine lights in the tic-tac-toe matrix.

Q. All right. What relation if any then did the three corner or diagonal or any row objective have to the row of eight switches?

MR. SCHNAYER: Objection to the question. Leading.

THE WITNESS: Each switch had a number on it. The matrix of the tic-tac-toe has numbers on it. Each switch corresponds to a position in the matrix.

MR. HARDING: Now, you indicated that the equipment that Mr. Johnson provided to you was different in respect to the back display panel?

THE WITNESS: A. Back display panel.

MR. HARDING: Q. Can you describe what if anything your group had in place of that back display panel?

MR. SCHNAYER: Objection to the question as lack of foundation as to whether his group had anything in replacement of that.

THE WITNESS: Basically what we had was a PC board that had the display on it in lights, a three by three matrix so that it was functionally the same as the final game, although not physically the same.

MR. HARDING: Q. When you say "functionally the same," is that depicted in the GD228?

THE WITNESS: A. Right.

MR. SCHNAYER: Objection. Leading.

MR. HARDING: Q. All right. Will you continue with your description of the game play?

THE WITNESS: A. Okay. The player was allowed three balls. If he rolled through the number two slot he got the ball over, so in essence he could get four balls.

Q. When you say the number two slot, you were referring with your pencil to the number two switch?

A. Right. There are two guide posts on each side of the switch. It slides down through the slot. It has to contact the switch.

Q. Is there a switch in the slot?

A. There is a switch up through the play field that the ball rolls over.

Q. Are you familiar with the type of switch that was--

A. The ones that we worked with that were on this board were just standard switches with a long lever that came up through the play field.

MR. SCHNAYER: Objection to the question as lack of foundation.

MR. HARDING: Q. How do you know this?

THE WITNESS: A. Because they were physically there. They were attached to the play field.

Q. You observed them?

A. I observed them.

Q. All right. The ball I gather was on the play field and had rolled through a number two switch. Is there any other action of the ball in the play field?

A. After it goes through the switches it rolls down to the bottom of the play field into a tray.

Q. When you say the switches, which switches if any are you referring to?

A. Either the row of switches or the number two switch. After it passes through those it rolls to the bottom of the tray. There was an incline. The ball rolled down the incline on to a switch. That switch was closed. A processor

detected it. If it was not in the game, if the player had another ball coming, the ball kicker was energized to kick the ball back up into the area for shooting the ball.

Q When you say "the area for shooting the ball," you were pointing to some other object in the picture.

A Yes. The end of the play field was a trough that the ball was shot out of by the ball plunger.

Q Can you circle the ball plunger, please, in GD229 and say "plunger" or whatever you want to mark it?

A (The witness indicates.)

Q How was the ball plunger to be activated?

A By the use of the player physically pulling it back whatever distance he deemed was a good distance to get the switch he wanted.

Q You referred to a ball. What type of a ball were you referring to?

A Just a round steel ball. A normal pinball.

Q Normal pinball?

A Yes.

Q Now, you mentioned credits, I believe.

A Correct.

Q What indicators were there, if there were any, to show the number of credits a player had?

MR. SCHNAYER: Objection to the question. Lack of foundation.

THE WITNESS: There were seven-segment LED displays for the credits and the plays.

MR. HARDING: Q Mr. Kute, were you familiar with

the equipment you are describing in 1975 when you were working on this project?

THE WITNESS: A. I was at that time.

Q. For example, did you physically inspect the displays?

A. I am not sure what you mean by "inspect."

Q. Actually observe the displays, how they were connected, the operation if they operated.

A. Yes, I did.

Q. Did you actually observe the switches in their location and their operation that they operated?

A. Yes, I did.

Q. Did you actually use the ball plunger to propel a ball onto the play field?

A. Yes.

Q. Okay. You indicated that you, Mr. Winter and Mr. Schwartz were involved in the hardware implementation; is that correct?

A. Correct.

Q. What was your involvement?

A. I was the overall manager of the group, and I did a good portion of the logic design for the system.

Q. Referring to GD225. Have you seen those documents before today?

A. Yes, I have.

Q. Are you familiar with the subject matter of those documents?

A. Yes.

Q Can you indicate in those documents what if any portion thereof you designed?

A By page or by blocks on the page?

Q Maybe if you would just refer to the GD225 and explain to me your design involvement in the subject matter depicted there.

A Okay. I designed the memory interface, the bus interfaces, the control buffering, most of the switch logic, the interface to the display tic-tac-toe matrix of the lamps, the LED latches, the address decoding circuitry.

MR. WELSH: May I have that?

(Whereupon, the preceding answer was read by the Reporter.)

THE WITNESS: The switch matrix and interrupt logic. That's most of it.

MR. HARDING: Q Okay. I'd like for you to refer to GD234 and ask if you have ever seen that document before.

THE WITNESS: A Yes, I have.

Q What is it?

A This was the PACE CPU applications card.

Q Did the circuit depicted in GD234 bear any relation to the PACE 16-bit one-chip microprocessor that you mentioned earlier?

MR. SCHNAYER: Objection to the question as lack of foundation that he is familiar with the circuitry depicted in GD234 and to his familiarity with the PACE.

THE WITNESS: The PACE applications card was a card

that we designed with the heart of it being the PACE one-chip CPU to be used in general customer applications.

MR. HARDING: Q Who is "we designed"?

THE WITNESS: A Microprocessor group. I did not have anything to do with the design of this card.

Q Did this application card have anything to do with the development project for the OXO game?

MR. SCHNAYER: Objection to the question as lack of foundation that this witness has personal knowledge as to that.

THE WITNESS: Yes. We used this card as the CPU card in the system.

MR. HARDING: Q Now, can you tell me what portion of the CPU application card you used in the OXO system?

MR. SCHNAYER: Objection to the question as vague as to the use of any documents.

THE WITNESS: I am not sure I understand the question.

MR. HARDING: Q Okay. Can you tell me how the PACE CPU application card was used in the OXO project?

MR. SCHNAYER: Objection to the question as lack of foundation.

THE WITNESS: The PACE CPU card was the basis for the whole system. The bus interface was tied into the system to drive the rest of the game.

MR. HARDING: Q Can you point out this bus on the document GD234?

THE WITNESS: A The bus is --

MR. SCHNAYER: Objection to the question as lack of

foundation as to whether that is the PACE he is talking of.

THE WITNESS: The bus is on the right-hand side of the document.

MR. HARDING: Q Can you identify those by numbers?

THE WITNESS: A. 2A, B, C and D. The BDO section.

Q. What do you mean by the BDO section?

A. BD zero through 15 is the address databus ~~in~~ and bads, ~~bauds~~ bods and bids of the control signals.

Q. In your work on this project did you personally work with the PACE application card in the design in the OXO development?

A. For the final checkout we used the PACE applications card. In the development of it we used a development system which had a connector that emulated this PACE application card.

Q. In the final checkout you said you used it. What do you mean you used it?

A. When the customer came down to accept the game the PACE applications card was in the system.

Q. At that time were you familiar with how the PACE applications card interfaced to the remainder of the system?

A. Yes, I was.

Q. I would like you to describe in your own words the structure of the system that was developed to control this OXO game using the documents in front of you.

MR. SCHNAYER: Objection to the question. Lack of foundation as to whether this witness has knowledge of the entire structure, first-hand knowledge.

MR. HARDING: Q Do you have knowledge of how the game operated?

THE WITNESS: A Yes, I do.

Q I am sorry. Is it accurate to call this a control system?

A I am not sure I understand the question.

Q What would be a term that you would use to describe the system developed by your group for the OXO game?

A Basically all we called it was the pinball game.

Q You didn't design the game field; did you?

A No, we didn't.

Q Just the electronics?

MR. SCHNAYER: Objection to the question as leading.

MR. HARDING: Q The electronics. Was the electronics controller the controller for the pinball game?

THE WITNESS: A Right.

MR. SCHNAYER: Objection to the question as leading.

MR. HARDING: Q So, is it accurate then to refer generally to what you developed as a controller?

MR. SCHNAYER: Objection to the question as leading.

THE WITNESS: Yes.

MR. HARDING: Q Do you have any other language you would prefer to call it?

THE WITNESS: A No.

Q Were you familiar with the structure of the controller that was developed by your group for this project?

A Yes, I was.

Q All right. Would you in your own words describe

the structure of the controller using an referring to the documents you have in front of you?

MR. SCHNAYER: Objection to the question as lack of foundation that this witness has knowledge about the entire operation of the controller as depicted in the documents before him.

THE WITNESS: Based around the CPU applications card.

MR. HARDING: Q What do you mean "based around the CPU applications card"?

THE WITNESS: A. The assumption in designing the game was that the PACE CPU applications card would be the heart of the system and control the rest of the logic, which would be spread out throughout the system wherever it was required. Within the enclosure of the CPU was the memory, the switch matrix circuitry.

Q Can you refer to the memory in any drawings in front of you?

A. The memory is on sheet one, GD225.

Q Can you identify specific devices?

A. 2101 of the RAMS. 5204 of the PROMS.

Q What do you mean by RAM?

A. Random access memory.

Q What do you mean by PROMS?

A. Proms were the programmable read-only memory.

Q I see on sheet one there are four 2101's; is that correct?

A. Correct.

Q There were four random access memories?

A Four chips. Right.

Q Do you know the memory capacity of those chips?

A 256 by four.

Q I see there are two 5204 PROM chips; is that correct?

A Correct.

Q And do you know the memory capacity of those?

A ~~15 12~~ 512 by ~~eight.~~ 8

MR. SCHNAYER: Continuing objection as lack of foundation on those questions.

MR. HARDING: Q You did say you were familiar with the structure of the controller?

THE WITNESS: A Yes, I am.

Q Okay. How were these memory chips connected to the CPU card if they were connected?

A They were connected over the databus shown on GD234.

Q And how were they connected? What terminals were connected to what terminals, if there were such connections?

A The BD lines were connected. This was the complete databus for the PACE applications card. Address and data go out and are received back over those lines.

Q That's the BD lines on GD234?

A Correct.

Q All right. And those are connected to what terminals of the memory devices we have talked about?

A They are connected through interface logic to the address and data lines on the memory parts.

Q What interface logic are you referring to?

A. The 8095's and the 74174's.

Q. And what sheets are those on?

A. The 8095's are on sheet one of GD225, and the 74174's are on sheet four of the same.

MR. WELSH: Could I have that answer?

(Whereupon, the preceding answer was read by the Reporter.)

MR. HARDING: Q So, the BD bus of the CPU was connected to what device?

THE WITNESS: A. They were connected to a number of devices.

Q In order to access memory what devices were they connected to?

A. They were connected to the 2101's for read/write memory and the 5204's for instruction memory.

Q You indicated earlier there was interface logic. The drawings as I see do not show interconnecting lines from hardware component to hardware component, so now in a general way I would like to have you describe the physical connections, if there are such connections, between actual components in the schematic in order to explain the controller structure.

A. The 74174's on page four -- the address lines coming -- the AD lines coming out of the 74174's were connected to the appropriate address lines on the 2101's and the 5204's.

Q What address lines are you referring to?

A. A0 through 7 on the 2101's. A0 through A8 on the

5204's.

Q You mentioned an 8095 circuit. Is that connected?

A Yes. There are also two gates for the chips selects for the memory which are labeled 4M on sheet one. The address lines are connected also.

Q All right. The 8095 on sheet one is where?

A The 8095's are labeled 5H, 5J and 5K.

Q And are those connected in the memory access?

A They are connected DI -- are connected DI's on the memory chips. DO's are connected to DO's on the memory chips. BD I/O's are connected to a bus.

Q Okay. You also mentioned I believe a switch matrix; is that correct?

A Correct.

Q Can you explain where the switch matrix is shown in the drawings, if it is shown?

A The switch matrix is shown on sheet four.

Q And is there any particular designation?

A Just the label switch matrix with an arrow pointing to them.

Q All right. Was that connected to the PACE CPU card?

A Yes, it was. It was connected through the BD bus again by an interface device labeled 6J. The scan selection was done by a 74154 decoder labeled 4N, which was connected to the address bus.

Q What address bus are you referring to?

A The latched addresses of the 74174's on the same

page.

Q Those lines are designated what?

A AD00 through AD 15.

Q Referring to the switch matrix. Do you recall how many switches were connected in the matrix?

A There are eight switches.

Q And do you have a reason for calling it a matrix?

A They were scanned in a two by four array.

MR. SCHNAYER: Objection to the question as lack of foundation that this witness had an opinion, reason for calling it switch matrix. Objection to the question as lack of foundation as to whether this witness had an opinion then or whether he formed an opinion today.

MR. HARDING: Q Do you know who originated the term "switch matrix" as it appears on document GD225, sheet four?

MR. SCHNAYER: Objection to the question as lack of foundation as to whether this witness would have knowledge of that and hearsay, possibly.

THE WITNESS: From the handwriting I would say it's Keith Winter.

MR. HARDING: Q Do you recall, referring to the two by four array of switches as the switch matrix in the 1975 time frame?

THE WITNESS: A Not specifically.

Q Are you familiar with the operation of the controller insofar as the switches were actuated by the rolling ball on the play field?

A. Yes.

Q. All right. Can you explain to me how the controller that we have characterized so far in general terms operated with respect to the ball actuating the switches?

MR. SCHNAYER: Objection to the question. Lack of foundation as to whether this witness had first-hand knowledge.

THE WITNESS: Okay. Are you referring to the play switches or all of the switches?

MR. HARDING: I guess I would like to refer first to the switches in the switch matrix two by four.

THE WITNESS: Okay.

MR. SCHNAYER: Objection to the question as leading. The witness has not testified as to the two by four array.

THE WITNESS: Okay. The switch matrix was tied via 6H to interrupt level three.

MR. HARDING: Q. What do you mean 6H?

THE WITNESS: A. 6H is an interface device which ANDS all of the switches together.

Q. What type of a device was it, if you know?

A. It is a four put ~~and eight~~ AND gate. When the system is started, when play is started the Scan A and Scan B out of device 4N are both high, which sets the Scan A, Scan B to the matrix low, such that anytime a switch is ~~loaded~~ closed a low is generated on NIR3 to interrupt the processor.

Q. Okay. Let me go back and ask you to describe in a little more detail just for the record the interconnection of the switches in the two by four array. What do you mean by the term two by four array?

A. Okay. In order to read the switches there was two scans required. Each scan brought in information from four switches, which was then evaluated to see whether that switch was closed or whether it was not closed.

Q. All right. Can you explain the interconnection of the switches in the two by four array?

A. Okay. During --

Q. This is just the interconnection of the switches in the two by four array.

A. Okay. The switches are interconnected such that switches five, nine, seven and eight are connected together on one end.

Q. What do you mean on one end?

A. One side of the switch is all tied together. Switches one, three, six and four are tied together.

Q. What do you mean are tied together?

A. They are all interconnected on one side. On the other side switches one and five are connected together, three and nine are connected together, six and seven are connected together and four and eight are connected together.

Q. This effects a two by four array?

A. Yes.

MR. SCHNAYER: Objection to the question as leading.

MR. HARDING: Q. You have referred to Scans I believe in your earlier testimony.

THE WITNESS: A. Right.

Q. Are there scan lines going to the switch matrix?

A. There is a Scan A line, which is connected to

switches five, nine, seven and eight. Scan B lines, which is connected to one, three, six and four.

Q All right. Are there lines output from the switch matrix?

A Yes. The lines out of the switch matrix are connected. There are four lines. Switch one and five are connected together, three and nine together, six and seven and four and eight.

Q What are these output lines connected to?

A The output lines are connected through buffer six J to the PACE CPU application card for reading the data.

MR. SCHNAYER: May I have that answer back, please?

(Whereupon, the preceding answer was read by the Reporter.)

MR. HARDING: Q Now, are these output lines connected to anything else?

THE WITNESS: A On the bus side or --

Q Yes. You mentioned a six H component earlier.

MR. SCHNAYER: Objection to the question as leading.

THE WITNESS: The output of the switches are connected to the AND gate 6H which generates the interrupt.

MR. HARDING: Q What interrupt are you referring to?

THE WITNESS: A Interrupt level 3.

Q And is that designated by any designation on sheet four?

A NIR3.

Q You referred to buffer 6J. Do those devices generate signals as indicated on sheet four?

A. They generate data that is determined by the switch closures, and the Scan A, Scan B signals.

Q. Do those signals have designations?

A. BD I/O signal, one, two and ~~fifty.~~ fifteen.

Q. And you say data. What do you mean by data?

A. Either a zero or a one depending on whether the switch is opened or closed.

Q. And what would cause the switch either to be opened or closed?

A. The ball rolling over the lever closes the switch.

Q. All right. You indicated you were familiar with the operation of the controller as to the switch matrix; is that correct?

A. Yes.

MR. SCHNAYER: Objection to the question as vague by operational controller.

MR. HARDING: Q. Will you now describe in your own words how data relating to whether a switch is opened or closed is communicated to the PACE CPU?

THE WITNESS: A. Signaling Scan A star, Scan B star.

Q. That is generated by what device?

A. Which is generated by the decoder at 4N.

Q. What causes that device to generate those signals?

A. Those are done under the control of the microprocessor by addressing that particular address location.

Q. That is the microprocessor on the CPU card?

A. Right. PACE application card.

MR. SCHNAYER: Objection to the question as leading.

THE WITNESS: During the play of the game Scan A star and Scan B star are both at one level, which causes the side of the switches which are interconnected to both be at a zero level, such that anytime there is a switch closed a zero appears at NIR3 causing an interrupt.

MR. HARDING: Q What do you mean "causing an interrupt"?

THE WITNESS: A. A negative zero level signal on NIR3 will cause an interrupt in the PACE CPU if it's enabled.

Q. And what does the PACE CPU do in response to the interrupt NIR3?

A. Interrupt level 3 is the switch matrix service routine in which case it will go out and address the Scan A line. Once the Scan A line goes low Scan A star is low, the line connected to five, nine, seven and eight switches will be low. The line connected to the other four switches will be high. All four switches are then read into the PACE via the 6J buffer and can be interrogated to see if anyone of those four lines is low, which would mean a switch closure.

If that is not closed then Scan B will be addressed, which will take four, six, three and one low, and the other set high. We will interrogate again through buffer device 6J to see if any of those four switches is closed.

Q. What causes Scan B to be generated?

A. The processor controls in that PACE processor.

Q. In referring to the switch matrix and a two by four array, are you indicating then that one four-switch array

is first interrogated and, second, the other four-switch array is interrogated?

MR. SCHNAYER: Objection to the question as leading.

THE WITNESS: Yes.

MR. HARDING: Q Would you please refer to the operation of the switch matrix in terms of the four-switch arrays?

THE WITNESS: A Okay. During the first scan, Scan A, the four switches five, nine, seven and eight are scanned. During the second scan, Scan B, the four switches, one, three, six and four are scanned.

Q When you say "scanned," what are you referring to?

A Being that the data is read in as a four-bit data block. All four switches read in during Scan A and the other four switches read in during Scan B.

Q What does the PACE microprocessor do in response to the information it receives from the Scan A and Scan B?

A It detects which switch is closed, which switch the ball has rolled over. It stores it away for later processing at game end and lights the appropriate light in the display matrix.

Q Are you familiar with the circuitry used for lighting the appropriate lights that you have just referred to?

A Data is written out to a latch.

Q Are you familiar with that circuitry?

A Yes. To some extent.

Q Will you indicate where in these drawings that

circuitry is?

MR. SCHNAYER: Objection to the question. Lack of foundation as the extent of his familiarity with that.

THE WITNESS: The driver circuitry for the lamps is on sheet five.

MR. HARDING: Q What specifically are you referring to?

THE WITNESS: A. The optoisolators through some interface circuitry into the 24 volt, 28 volt lamp drivers.

Q What optoisolators specifically by designation are you referring to?

A. 1CT, 1CV, 1BT, 1BB, 2BT, 2BB, 3BT, 3BB, 4BT and 4BB.

Q Are the lamps depicted on sheet five?

A. Correct. The lamps are numbered one through eight.

Q Can you point out those in the drawing for me?

A. One, two, three and nine.

Q Is there a symbol you are referring to?

A. A letter next to the lamp indicator, squiggly line or two half circles connected.

Q And that's on the right-hand side of the page and two columns. I am sorry. Right-hand side of the page two rows, one slightly under the B Road Map.

MR. SCHNAYER: Objection to the question as leading.

THE WITNESS: B1.

MR. HARDING: Q Is that correct? Is that where you are referring to in the drawing?

THE WITNESS: A. Right.

MR. SCHNAYER: Objection to the question as lack of

foundation.

MR. HARDING: Q Have you ever heard of the term multiplexing as applied to microcomputers?

THE WITNESS: A Yes.

Q Had you heard of the term multiplexing as applied to microcomputers in the year 1975?

A I don't know specifically whether I heard it with respect to microprocessors at that time or not.

Q Had you heard of the term multiplexing in 1975?

A Yes, I had.

Q What was your definition of the term multiplexing in 1975?

A Time sharing of functions.

Q Had you ever formed an opinion in connection with the switch matrix whether or not the switch states were multiplexed into the PACE CPU?

MR. SCHNAYER: Objection to the question as lack of foundation.

THE WITNESS: No. I hadn't really thought about it.

MR. HARDING: Q Have you thought about it at anytime?

MR. SCHNAYER: Prior to today, counsel?

THE WITNESS: No. I really hadn't. I hadn't thought about it in those terms at all.

MR. HARDING: Q Okay. You did refer to the BD I/O 0, 1, 2 and 15 lines as being data lines?

MR. SCHNAYER: Which are you referring to, counsel?

MR. HARDING: BD I/O.

MR. SCHNAYER: Which page?

MR. HARDING: Page four, 0, 1, 2, and 15.

THE WITNESS: Correct.

MR. HARDING: Q Referred to those as data lines; is that correct?

THE WITNESS: A. Correct.

Q At some point in time did those data lines contain signals representing one array of the switches?

MR. SCHNAYER: Objection to the question as leading.

THE WITNESS: Yes, they did.

MR. HARDING: Q And in a second point of time did they contain signals representative of the second array of switches?

THE WITNESS: . A. Yes, they did.

Q. Have you ever heard of the term "switch bounce"?

A. Yes.

Q What is your understanding of the term switch bounce?

A. A switch bounce is a mechanical feature of most any switches that are not mercury wetted or very expensive switches. When they are first closed there will be a rubbing action and a bouncing action where they are making and breaking contact as they close and as they reopen.

Q Did the switches in the OXO game feature switch bounce?

A. Yes, they did.

MR. SCHNAYER: Objection to the question as lack of foundation.

MR. HARDING: Q Did switch bounce pose any type of a problem to the controller that you built?

MR. SCHNAYER: Object to the question as lack of foundation.

THE WITNESS: It did. In that order, too. To make sure we had a good switch closure we did a software delay between scans to make sure the switch was actually closed and did stay closed.

MR. HARDING: Q What do you mean "between scans"?

THE WITNESS: A We scanned both A and B lines of the switch matrix multiple times with a delay between scans to debounce the switch and make sure it was a good switch closure.

Q Did you ever determine whether that was an appropriate technique to deal with switch bounce?

MR. SCHNAYER: Objection to the question as lack of foundation.

THE WITNESS: Yes, we did.

MR. HARDING: Q What was your determination?

THE WITNESS: A We determined to make a reliable reading on the switch that was needed to debounce the switches.

Q I am saying did you with the technique you described accomplish that?

A Yes, we did.

MR. SCHNAYER: Objection to the question as lack of foundation.

MR. HARDING: Q Now, you mentioned that interrupt NIR3 was generated when a switch was closed; is that correct?

THE WITNESS: A. That's correct.

Q. And then you mentioned that the microprocessor generated the Scan A and then the Scan B sequence; is that correct?

A. That's correct.

MR. SCHNAYER: Objection to that question as leading.

MR. HARDING: Q. Now, where you refer to that sequence and what you mean by the switch multiple scan sequence debounce or whatever you referred to? Go through, if you would, that whole sequence and tell me how data was read into the CPU.

THE WITNESS: A. Okay. The interrupt was generated. The processor was vectored to the ~~double~~ number three interrupt routine. In that routine Scan A was turned on, read back in. Scan B was turned on and read back in.

There was a delay. Scan A was again read back in. Scan B was again read back in. They were compared to make sure the same switch had stayed down and there was not a noise spike and there was indeed a valid key closure.

Q. Did you ever detect problems after implementing this routine which you related to switch bounce?

MR. SCHNAYER: Objection to the question as leading.

THE WITNESS: No, we didn't.

MR. HARDING: Q. Did you detect any problems after implementing this sequence with actually detecting switch actuation?

THE WITNESS: A. No, we didn't.

MR. SCHNAYER: Objection to that question. What do

mean by you? Him or you or people that he worked with? Hearsay.

MR. HARDING: Q So that you will understand the question, it takes a finite time, does it not, between the generation of the level three interrupt and the second of the Scan B scans?

THE WITNESS: A Yes, it does.

Q And a switch when operated is operated also only for a finite time; is that correct?

A That's correct.

Q Did you detect any difficulties in detecting the actuation period of the switches because of the finite time period that it took to generate the interrupt and then perform the multiple-scan sequence?

MR. SCHNAYER: Objection to that question as vague and lack of foundation as to whether this witness knows of that of his own personal knowledge.

THE WITNESS: No, we didn't.

MR. HARDING: Q To your knowledge, did anyone of your group?

MR. SCHNAYER: Objection. That question calls for hearsay.

MR. HARDING: Q You were a group leader of this project; right?

THE WITNESS: A Correct.

MR. SCHNAYER: Objection to that question as leading.

THE WITNESS: We would have changed the scan sequence had we had problems with it. When we turned it over to the

customer it was well tested and well proven that we did not miss switches and we did not falsely detect switches.

MR. HARDING: Q Now, did there come a time when you considered this game development completed?

THE WITNESS: A Yes, there was.

Q Approximately how long a period of time after you commenced the project was that?

A Approximately six weeks.

Q And did you play the game after you had considered the project completed?

A Yes.

Q Did you form any opinions as to how adequately the game played?

A I formed the opinion that it played exactly the way the customer requested us to implement it.

MR. SCHNAYER: Objection to the question as calling for lack of foundation as to whether the witness had an opinion as to that or whether he formed an opinion here today.

MR. HARDING: Q Now, you mentioned nickels, dimes and quarter counters I believe earlier.

THE WITNESS: A Nickels, dime and quarter switches from the coin box, yes.

Q Okay. Was there circuitry in the game to determine the number of nickels, dimes and quarters entered into the OXO game?

A Yes, there was.

Q Is that circuitry shown in GD225?

A It should be. That was Milt's circuitry.

MR. SCHNAYER: Again objection to the question as lack of foundation.

MR. HARDING: Q Did you have any responsibility in the project for the nickels, dimes and quarter switch detection circuitry?

THE WITNESS: A For the switch detection circuitry I did. For the control of the credits counter, which is basically just a solenoid kicker that kicks the mechanical counter, Milt did the interface on that. I did the interface on the detection of the coins, which was read into the processor, determined whether it was a nickel, dime or quarter, and then there were serial pulses sent out to the credit counter.

Q Is that circuitry shown in GD225?

A Yes. The input circuitry is shown on sheet four on the right-hand side of the drawing.

MR. SCHNAYER: Excuse me, counsel. Did you point to something?

THE WITNESS: I didn't point to anything.

MR. HARDING: Q Are there any circuit designations generally what you referred to on sheet four, the right-hand side?

THE WITNESS: A There is a switch indicator which is labeled five cents, ten cents and twenty-five cents, and the interrupt signal NIR4 which generates a level four interrupt. The processor then comes back and scans the switches.

Q What switches?

A. The nickel, dime and quarter switches. On the BD I/O 0, 1, and 15 lines to make a determination of which sized coin was put in.

Q. And if it detects a coin input, what next happens?

A. Okay. The credits display is incremented, and the coin counter was incremented.

Q. Is the coin counter shown in GD225?

A. I don't see it. I don't see it here.

Q. What type of a counter was it?

A. Basically just a mechanical counter incremented for the coins put in.

Q. What controlled the incrementing of the counter?

A. To the best of my recollection, it was the processor.

Q. The PACE microprocessor?

A. PACE microprocessor.

MR. SCHNAYER: Objection to that question as leading.

MR. HARDING: Q. Did you observe anyone else playing the OXO game at the completion of the project?

THE WITNESS: A. Yes, I did.

Q. Who did you observe playing it?

A. Frank Johnson. Almost everyone in the microprocessor group at the time played it, including the marketing group. All of the fellows that worked on the job played it.

Q. Do you recall any opinions expressed by those individuals --

MR. SCHNAYER: Objection to the question as calling for -- sorry.

MR. HARDING: Q -- as to the operation of the controller when they played the game ?

MR. SCHNAYER: Objection to the question as calling for hearsay.

THE WITNESS: Everyone that played it agreed with the fact that it worked.

MR. HARDING: Q Referring to the play field on the game. Do you recall whether the play field was flat or whether it was tilted or what orientation the play field was at?

MR. SCHNAYER: Counsel, are you pointing to the exhibit of the play field, the finalized game? Do you mean the finalized game that is shown in that diagram, or do you mean the finalized game he actually built? Objection to the question as vague.

THE WITNESS: The play field was tilted. There was a limited amount of tilt that it could sustain without the tilt mechanism tilting.

MR. HARDING: Q You only saw one play field; is that correct?

THE WITNESS: A. That's correct.

Q That was the game that you developed the controller for?

A. Correct.

MR. SCHNAYER: Objection to the question as leading.

MR. HARDING: Q Now, you referred to the PACE as a 16-bit microprocessor?

THE WITNESS: A. Yes.

Q And how many data lines does the PACE have?

A. It has 16 multiplexed address and data lines plus various single ~~slag outputs~~ flag outputs and sense inputs.

Q How many switches were monitored by the PACE CPU?

A. Anywhere to 15.

Q How many play fields switches were monitored by the PACE CPU?

A. Nine.

MR. SCHNAYER: Objection to the question as lack of foundation.

MR. HARDING: Q How many play field switches in the matrix were monitored by the PACE CPU?

THE WITNESS: A. There were eight switches in the matrix.

Q. The data from those switches was read in on four of the 16 data lines of the PACE CPU?

MR. SCHNAYER: Objection to the question as leading.

THE WITNESS: Yes. That's right.

MR. HARDING: Q On how many lines were the switch data read into the CPU from the matrix?

THE WITNESS: A. From the matrix there were four data lines.

Q And how many data lines were available to read the switch data had you chosen to use them?

A. 16.

MR. SCHNAYER: Objection to that question as looking for an opinion.

MR. HARDING: Q Did you ever consider using more

than four of the data lines for reading switch information into the PACE CPU?

THE WITNESS: A. In the original concept we had thought of it. In the final design it turned out it was much easier to handle them in a two by four array.

MR. SCHNAYER: Objection to the question as lack of foundation and vague as to whether this witness -- you are asking the witness to testify as to his knowledge or as to that of people that worked with him on the project?

MR. HARDING: Counsel, you are going to get your opportunity to cross examine.

Q. What do you mean it was easier to read in on the four lines rather than on more than four lines?

THE WITNESS: A. It was easier to decode the specific switches by reading them in that manner.

Q. Mr. Kute, when you indicated that, to your recollection, the project commenced in May or June, was that in the year 1975?

A. Yes, it was.

Q. And to your recollection, what date was the project completed?

A. I believe it was July 16th.

Q. Of what year?

A. 1975.

Q. Referring back to GD225. Did you participate in the preparation of any documentation for the OXO controller project?

A. Yes, I did.

Q If you would refer to document GD225. Would you tell me if you prepared any of those documents or any portions of those documents?

A. Yes, I did.

Q Can you tell us for the record which ones you prepared portions of?

A. All of sheet one, all of sheet two, none of sheet three, a portion of sheet four, all of sheet five and all of sheet six.

Q All right. Referring to sheet one. Do you recall the approximate date that you did that document?

A. It would have been May-June.

Q Of what year?

A. 1975.

Q. Do you recall when you created sheet two?

A. They were all done within that time frame, within a week or two of that. Mid June to the end of June.

Q Are you referring now to sheets one, two, four, five and six?

A. Yes. Correct.

MR. SCHNAYER: Objection to the question. Lack of foundation. He said only a portion of sheet four.

MR. HARDING: Q Do you know who did the remaining portions of sheet four?

THE WITNESS: A. Keith Winter.

Q How do you know that?

A. He signed it.

Q I note a date of 6-26-75 on there. Do you know with

respect to that date when you did the portion that you did?

A. It would have been prior to that.

Q. Okay. On document GD234, I'd like you to look at it once again. In the lower right-hand corner there is a number D8704362, and then in a separate little box the number 1. Are you familiar with what the number 1 as a suffix of that document refers to?

A. Number one is the engineering release version of the board.

Q. All right. Have you ever had occasion to use document 8704362 suffix 1 in your work here at National?

A. Yes, I have.

Q. And do you recognize the contents of GD234 to be that of document 8704362 suffix 1?

MR. SCHNAYER: Can I have that question back?

THE WITNESS: Yes, I do.

(Whereupon, the preceding question was read by the Reporter.)

MR. SCHNAYER: Objection to the question as lack of foundation as to whether this witness is familiar with the circuits depicted in this document.

MR. HARDING: Those are all the questions I have on direct.

EXAMINATION BY MR. SCHNAYER

MR. SCHNAYER: Q. I show you copies of documents that I have testified to previously which are six pages of GD225. I ask you if you would please point out to me where the play field switches are depicted on those documents.

THE WITNESS: A. Nine of the switches are shown on sheet four.

Q. And where is that? Would you point that out?

A. Sheet four B2 and C2 and 3.

Q. Would you actually point those switches out?

A. This is switch two and these are the other eight. (Indicating.)

Q. And I believe you were testifying previously as to how information representative of a switch closure is then inputted into the microprocessor; is that correct?

A. That's correct.

Q. When a switch is present on any of the switches, which is shown on the eight switches on page four, that will generate an interrupt on the CPU; is that correct?

A. That's correct.

Q. And that will cause a routine to be entered by the CPU; is that correct?

A. That's correct.

Q. Now, I believe you testified that that would first generate a first strobe scan A; is that correct?

A. Correct.

Q. If a switch were closed when Scan A occurred --

MR. HARDING: I am going to object to the question as being a mischaracterization. He did not testify that Scan A was first generated.

MR. SCHNAYER: Q. When Scan A is generated and if a switch were closed and the microprocessor sensed, the output lines of the switches to determine if any switch were closed,

would the microprocessor then generate a scan B?

THE WITNESS: A. Yes, it would.

Q. And would that occur even if a switch were closed?

A. Yes, it would.

Q. And then the microprocessor -- strike that.

Then the program would have a certain delay time; is that correct?

A. That's correct.

Q. And then Scan A would be generated again?

A. Correct.

Q. And then a Scan B would be generated?

A. Correct.

Q. Will the order of scans that are generated, first Scan A, then Scan B and then Scan A and then Scan B, always occur those four strobes in that order? Scan A, Scan B, Scan A, Scan B?

A. Yes, they will.

Q. Is there any condition they would not occur?

A. I don't know, I don't believe so. I'd have to go back and look at the listing to make sure that that is true. I believe that is true.

Q. How's the closure of the switch two read by the microprocessor?

A. Directly as an interrupt.

Q. And that would cause the microprocessor to go into an interrupt routine?

A. Correct.

Q. What is that interrupt routine called?

A. No. That is not true. Switch two is direct latched switch when it is closed.

Q. You were referring to sheet two?

A. Sheet two.

Q. You said switch two was latched; is that correct?

A. Correct.

Q. Could you please explain to me using sheet two and sheet four, if necessary, how the switch was latched?

A. Switch two is latched by what appears to be device 4J on sheet two.

Q. Where is that located?

A. Switch two is latched by 4J. It does generate an interrupt five denoted by NIR5, but it directly turns on the light.

Q. And what occurs when the interrupt five occurs?

A. (No audible response.)

Q. You are referring now to the exhibit GD227; is that correct?

A. Right. Software listing.

Q. Do you recognize this to be a copy of something you have seen before?

A. Yes, it is.

Q. What is that?

A. This is the software listing of the program that the PACE executed in controlling this game.

Q. How do you know that?

A. Because the name "pinball" on it and the comments.

Q. That is on the front page?

A. The title of the program and the comments within the program.

Q. You recognized those to be the comments of the program for the OXO machine?

A. Right.

Q. Were you involved at all in generating this document?

A. No, I was not.

Q. Did you ever analyze the document?

A. Yes. While we were debugging the system.

Q. You are familiar with this operation?

A. Correct.

Q. Could you please tell me what ~~NAR5~~ NIR5 -- when an interrupt occurs on ~~NAR5~~ NIR5 what that would do?

A. Disables the interrupt, makes sure the game starts, location and memory is initialized for the game start and then return. All it does is make sure that that switch closure tells the processor that a game is started and disables that interrupt from further interrupts.

Q. You were referring to what lines on there?

A. Lines 529 through 531.

Q. And that was on document GD227; is that correct?

A. Yes.

Q. And would you consider that switch two to be a play field switch?

A. Yes.

Q. How many times do the scans A and B occur when a game is in the normal operation, the OXO game, and a ball is

ejected onto the play field and then either it goes through the out hole and ready for the next ball to be ejected onto the play field?

A. During each ball travel the scan would take place twice. Twice for Scan A and twice for Scan B.

Q. Would it ever take place more than twice for each ball?

A. I don't believe so.

Q. Are you again looking at GD227 to answer that question?

A. Correct.

Q. And that sequence of Scan A, Scan B, Scan A, Scan B only occurs after an interrupt, the interrupt which would be represented by ~~NAR3~~ NIR3?

A. Correct.

Q. I want to make sure this is correct. When a ball is ejected onto the play field to the time it is ready to be ejected a second time, it goes down through the play field and put back into the ejector. That occurs only A, B, A, B; is that correct?

A. Correct.

Q. During the operation of the game if a ball was by the plunger to be shot onto the play field and the ball went onto the play field and went down over one of the switches, for example switch three, and then it went through the out hole and it went back into the injector and shot again onto the play field and it went again over switch three, would the microprocessor also generate an interrupt and then

generate a Scan A and Scan B and then a Scan A and Scan B again?

A. Yes, it would.

Q. Why would it do that?

A. Because a switch is closed. The processor does not know which switch is closed until it generates the Scan and evaluated the information received back.

Q. Referring again to the document which is GD225. Is there any digital display that is depicted in those documents?

A. What do you mean by "digital display"?

Q. For example, the seven-segment display that would display some information -- segment information.

A. Yes, there are.

Q. Where is that shown?

A. Sheet three.

Q. Is this a depiction of the display that was contained on the game you were involved in designing for the OXO game?

A. Yes, it is.

Q. How many digits were contained in that display?

A. Six.

Q. And referring to GD228. Is there an area which would depict where that display was located?

A. Yes. Four in the credits and two in the plays.

Q. What type of displays were those on the OXO game that you worked on?

A. NSN 61L's.

Q And those are shown in the right-hand corner of sheet three; is that correct?

A. Right-hand side.

Q The right-hand side?

A. Yes.

Q Okay. What type of displays are those?

A. They are seven-segment displays. I believe they were eight-tenths inch displays.

Q And there are six of them that are shown on the schematic on page three; is that correct?

A. Correct.

Q How would you characterize the drive of the displays that are shown on page three?

A. I would characterize it as direct drive.

Q When you say "direct drive," what do you mean by that?

A. They were not multiplexed.

Q Referring to page three. There is a device which is labeled 74174. What type of device is that?

A. It is a six-bit latch.

Q Referring to the device that appears to be connected to them by lines 7447. What type of device is that?

A. That's a ~~BCD27~~ BCD to 7-segment decoder.

Q And the device that is connected to that by lines -- it appears to be labeled 5A.

A. It is a resistor arrays.

Q Those are resistor arrays?

A. Right.

Q What is the function in the circuit of the 74174 labeled 2A?

A. That is to hold the display data for the seven-segment displays.

Q Is that for any particular seven-segment displays that are shown?

A. Well, 74174's and 175's are latches that hold the data for all of these.

Q Particularly the circuit 2A?

A. No. 2A holds part of the least significant credits LED and a portion of the third significant credits LED.

Q If the microprocessor during the operation of the game -- strike that.

During the operation of the game one of the lamps is to be -- one of the digits is to be lit, what type of signals appear on the device 2A in order to light the digit represented by the ones which is 6A on page three?

A. On the input 74174?

Q Yes.

A. It would be the four bits of data required to display the seven-segment information.

Q On that particular digit; is that correct?

A. Correct.

Q And how would that information be loaded into the latch?

A. By a decoded signal called CRLCH for credit latch.

Q That is shown on page three; correct?

A. Correct.

Q. And when those signals are latched into the six-bit latch, what signals appear on the output lines which are connected to device 3A?

A. After the clock or the latch signal comes into the data that was on, the input appears at the output.

Q. And therefore would that data appear on the input ports A,B,C, and D of device 3A?

A. Yes, it would.

Q. And when data appears on those input ports, what would appear on the output ports of device 3A?

A. The decoded version of that data which would display the A, B, C, D, E, F, G segment data to be lit on the display.

Q. What is the function of circuit 5A, which is connected to the output of 3A?

A. Just current limiting resistors.

Q. And the output lines A,B,C,D,E,F and G of device 5A. Those would be connected to the lines A, B, C, D, E, F, and G of device 6A?

A. Correct?

Q. That would cause the digit to light representative of information?

A. Correct.

Q. During the operation of the game if that lamp was to remain constant, would that stay on at all times?

A. Yes, it would.

Q. Unless it was to be changed. Then new information

would be clocked into the latch; is that correct?

A. That's correct.

Q. And that would appear as a different digit?

A. Correct.

Q. And do all of the digits as displayed shown on circuit three operate in a similar fashion to that?

A. Yes, they do.

Q. Referring to GD228. I believe you said this was in some way similar to the play field and stand that you received from OXO; is that correct?

A. That's correct.

Q. Excuse me. That was United Games. Do you understand my question to mean United Games?

A. Right.

Q. Did that game as you were involved in the design of it contain any flippers?

A. No, it did not.

Q. Did it contain any thumper bumpers?

A. I am not sure what a thumper bumper is.

Q. Have you ever played a pinball machine?

A. Yes.

Q. And have you ever had an occasion to see a ball hit a bumper and then be kicked back?

A. Yes.

Q. With that understanding that that is a thumper bumper, did the OXO game that you helped design contain that type of device, whatever it was called?

A. No, it did not.

Q And have you ever had the occasion to play a pinball machine which had a circular post sticking out when a ball hits that it is a shot away from the post?

A. The post shoots it away or the momentum bounces it away?

Q No. The post shoots it away. It is circular like a cylindrical --

A. I thought that's what you just asked. That's not the same as a thumper bumper.

Q Let's strike that and let's go back.

A. Okay.

Q The first feature I am interested in is have you ever played a pinball machine where the ball hits a bumper and is kicked back from the bumper?

A. By the bumper?

Q Yes.

A. Yes. I have played that.

Q And did the OXO machine you helped design contain that feature?

A. No, it did not.

Q Have you ever played a pinball machine which contained a feature which was a circular cylindrical shaped pole containing a lip over the top, and when the ball hit that device it was kicked away from the device?

A. Yes. I have.

Q And did the OXO device that you worked on contain a similar type device?

A. No, it did not.

Q I believe you testified previously that the PACE was a 16-bit machine; is that correct?

A That's correct.

Q Was there an 8-bit PACE also?

A No, there was not.

Q At the time you worked on this project, to your understanding, was National Semiconductor also building a microprocessor called SC/MP?

A No, it was not.

Q Were they building any other type microprocessors?

A Yes, they were.

Q What type of microprocessors were those?

A 16-bit multi chipped processor called ~~M16~~ IMP16 and an 8-bit multi chipped microprocessor called IMP8.

Q Were you familiar with the operation of the multi chipped processor IMP 8?

A Yes, I was.

Q And what was that familiarity?

A I have used it in some designs.

Q Had you used it in some designs previous to your work on the OXO project?

A Yes, I had.

Q And did you ever consider using an IMP8 for the OXO project?

A No, I didn't.

Q Do you know how much a PACE microprocessor was at the time you were working on that project?

A No, I don't.

Q Did you have any idea of the relative costs of a PACE microprocessor in an IMP8 chip set at the time you were working on the OXO project?

A Yes, I did.

Q What was the relative difference in cost?

A The PACE was cheaper.

Q Are you familiar with a microprocessor called SC/MP?

A Yes, I am.

Q Is that different than the Scamp we have been discussing?

A No. That is the same processor.

Q Were there any other 8-bit microprocessor or microprocessor chip sets manufactured by National at the time you were working on the OXO project, other than the IMP8?

A No, there was not.

Q When did you first become familiar with the Scamp microprocessor?

A I was familiar with Scamp at that time, however, it was not available yet. Still in design.

Q How did you know it was still in design?

A I was heavily involved in both PACE and SC/MP. They were done in our group. We were responsible for them.

Q When were SC/MP microprocessors available to the general public?

A I don't know the exact date.

Q Approximately.

A. Sometime during '76, I would guess.

Q. So, that would at least be several months after you worked on the OXO project; is that correct?

A. Right.

Q. Did you ever work with the SC/MP microprocessor at some later time after the project with the OXO with any work involving pinball machines?

A. No, I didn't.

Q. Have you ever been involved subsequent to your work on the OXO with any other project with involved games?

MR. SHERIDAN: I object to the question. Don't answer it.

THE WITNESS: Okay.

MR. SCHNAYER: I will rephrase the question. Do you have any reason for the objection?

MR. SHERIDAN: I don't want to get into work that we do outside of what this deposition is supposed to cover, which is the development for United Games.

MR. SCHNAYER: Without getting into any detailed discussion I am just interested generally. Can I ask the question as to whether he was involved and generally what he was involved with in the general sense?

MR. SHERIDAN: In a very general sense. Yes.

MR. SCHNAYER: Q. Can you answer the question in a general sense?

THE WITNESS: A. Will you repeat the question?

(Whereupon, the preceding question was read by the Reporter.)

THE WITNESS: Yes.

MR. SCHNAYER: Q And generally what was the subject matter of that project? What type of games?

THE WITNESS: You are not going to object to that?

MR. SCHNAYER: Q We discussed the fact we are going to say very -- generally what type of games.

MR. SHERIDAN: No company names, nothing like that.

MR. HARDING: Why don't you just answer whether it was pinball related or not. I think that's what he is getting at.

MR. SCHNAYER: Q I am still interested in generally what type of games.

THE WITNESS: A Various hand held games.

Q Any other games generally?

A No.

Q Were there optoisolators that were used in the OXO game that you were involved in designing for United Games?

A Not that I was directly involved in designing. Yes, they were used.

Q And how do you know they were used?

A As the overall manager of the group I knew everything that was in the game.

Q Did you actually see the optoisolators?

A Yes, I did.

Q Are there any optoisolators which are depicted in the drawing of GD225 which were contained in the OXO game that you worked on?

A. Yes, there were.

Q. Would you please show me where those are?

A. Page five, page six and page two.

Q. Referring to page five. The optoisolators that are depicted, are those used in the drive circuitry for the lamps?

A. Yes, they were.

Q. Do you know why optoisolators were used?

MR. SHERIDAN: I object to the question. He has stated he didn't design them.

MR. SCHNAYER: Q. Do you have any understanding why optoisolators were used?

THE WITNESS: A. Yes.

Q. What is that understanding?

A. There were basically two reasons. The voltage translation and secondly noise immunity.

Q. Upon what information did you form the basis for that understanding?

A. From the fellow that did the work on it.

Q. You discussed it with him?

A. Yes.

Q. Who is that?

A. Milt Schwartz.

Q. When you say "voltage translation," what do you mean by that? With regard specifically to optoisolators shown on page five.

A. Microprocessor -- the digital logic portion of the circuitry was all five volt. The lamps were 28-volt lamps.

Q And so the optoisolator allowed you to connect the drive circuit with a higher voltage to the lamps, the drive lamps; is that correct?

A That is correct.

Q Now, with respect to the noise immunity. Could you explain why the optoisolators were used because of that?

A Because the lamps were remote from the logic.

Q Do you know why they were made remote from the logic?

A Because they were on top of the play field. They were above the play field.

Q Was there ever any discussion that you were involved in or overheard where you discussed the reasons for using optoisolators because of noise immunity?

A Yes.

Q And what was the substance of those discussions?

A Basically make sure we didn't pick up any solenoid noise back up into the processor from the lines going to the lamps.

Q Did you ever discuss or hear discussed the fact that this could be done in another way, this being isolating or preventing noise from being picked up from the lines to the microprocessor?

A Yes. There were discussions of other ways of doing it.

Q Was the use of the optoisolators very expensive compared to the other methods?

A Not prohibitively so.

Q But they were more expensive; is that correct?

A. They were slightly more expensive and much more reliable in our opinion at that time.

Q Had you used optoisolators in other applications prior to working on the OXO project?

A. Yes, I had.

Q Prior to the work you did on the OXO project you worked on or were you familiar with work done by other manufacturers, other than National Semiconductor in their work involving design of solid state pinball machines?

A. No, I wasn't.

Q Did you ever hear any discussion of any work that was done by others than National Semiconductor, other manufacturers in designing solid state pinball machines?

A. No, I hadn't.

Q Were you aware of the existence of a solid state pinball machine prior to the completion of your work on the OXO project at National?

A. No, I wasn't.

Q Prior to work on the OXO project -- strike that.

Prior to the completion of your work on the OXO project, were you involved in any discussion or did you hear any discussion relating to any design work in anyway by any microprocessor manufacturers or pinball manufacturers relating to solid state pinball machines?

A. No, I hadn't.

Q Besides Mr. Johnson at United Games, were there any other employees or any other people you worked with from

United Games on that OXO project?

A. No.

Q. Do you know how big his company was at that time?

A. I have no idea.

Q. Did you deliver the prototype of the machine to Mr. Johnson after it was complete?

A. He came here and picked it up.

Q. Did you know if he ever performed any tests on the machine to see if it was acceptable?

A. He performed acceptance tests here before he accepted it. Yes.

Q. What type of tests did he perform?

A. Playing the game, just general tests to see that it worked correctly, rolling the balls over and things of that nature.

Q. Did he perform any noise tests?

A. I don't specifically remember whether he did or not.

Q. Did you perform any noise tests on the system?

A. Yes, we did.

Q. Do you have any understanding as to whether the game OXO was ever sold in a commercial amount?

A. I don't know.

Q. You never saw a complete game of one; is that correct?

A. That's correct.

MR. HARDING: I am going to object to the question. Definition of "complete game." I believe it's contrary to the witness' prior testimony.

MR. SCHNAYER: Q Were you ever involved in any discussions as to whatever happened to the OXO game that Mr. Johnson took?

THE WITNESS: A No, I wasn't.

Q Did you ever see an OXO game as the one that is depicted in Exhibit GD228 in that form?

A Not exactly that form.

MR. SCHNAYER: That completes my cross examination of the witness.

FURTHER EXAMINATION BY MR. HARDING

MR. HARDING: Q Just a few questions. I actually missed your answer to a question on cross in connection with the number of scans which could occur per a given ball.

Did you testify that you have a set of scan A's and Scan B's which two is actuated, or is it only when the array of play field switches generates an interrupt three?

THE WITNESS: A Scan A and Scan B take place only when a matrix switch closes.

Q Okay. Are you familiar with the time duration between the occurrence of Scan A and the occurrence of Scan B?

A Not exactly.

Q Approximately.

A Approximately 20 milliseconds.

MR. SCHNAYER: Objection to the question as lack of foundation.

MR. HARDING: Q Is that 20-millisecond time period constant from the first of the Scan A, Scan B

occurrences and the second Scan A, Scan B occurrences?

MR. WELSH: I though he said that time period was between Scan A and Scan B, not between the first set of scan.

MR. HARDING: Q Let me rephrase the question for you. You testified there was approximately 20 milliseconds between Scan A and Scan B during the first scan; is that correct?

THE WITNESS: A. No. That is not correct.

Q. Okay. Do you know approximately the time duration between Scan A and Scan B of the first scan?

A. I would have to guess at about 500 microseconds.

MR. SCHNAYER: Objection. Lack of foundation.

MR. HARDING: Q What is the basis for that answer?

THE WITNESS: A. As I remember the code, there is only a few instructions between Scan A and Scan B.

Q. All right. Referring to the second pair of scans. What is the time difference between Scan A and Scan B in the second pair of scans?

A. They are the same.

Q. Is the difference between Scan A and Scan B, whatever that difference is, always the same number?

A. The difference between the first Scan A and the first Scan B is always the same number. The difference between the second Scan A and the second Scan B is always the same number.

They are very close to the same number because they

are the same types of instructions executed.

MR. SCHNAYER: Objection to that question as lack of foundation.

MR. HARDING: Q What is the basis for that answer?

THE WITNESS: A. The coding of the scanning.

Q Were you familiar with the coding of the scanning?

A. Yes.

Q. Now, between Scan A and Scan B was a time period. Do you recall the extent of that time period?

A. I don't recall it exactly. No.

Q I am sorry. I think I asked the wrong question again. Between the first Scan A, Scan B and the second Scan A, Scan B pair there was a time duration. Do you recall that time duration?

A. No. Not exactly.

Q Do you know whether whatever time duration there was between the first Scan A and Scan B pair and the second Scan A, Scan B pair, whether that duration was constant from ball to ball?

A. Yes, it was.

Q It was constant?

A. Yes.

Q So, for every ball that traversed the play field downwardly there was a sequence of Scan A, Scan B, Scan A, Scan B scans; is that correct?

A. Correct.

Q And if the three balls which traversed down the

play field engaged the corresponding one of eight switches at a very regular time period, then the sequence of Scan A, Scan B, Scan A, Scan B would also occur at a very regular period; is that correct?

MR. SCHNAYER: Objection to the question as hypothetical.

THE WITNESS: Yes. That is correct.

MR. HARDING: Q You earlier referred to the databus as being a multiplexed address databus; is that correct?

THE WITNESS: A That is correct.

Q Multiplexed address databus. What did you mean by that term?

A There was a time sharing on the databus. Everything that happened takes place on the databus. There is an address sent out. There is either data sent out or data brought back on that same bus, so that the data is removed, the data is applied.

Q And that's multiplexing?

A Right.

Q By that definition then is the two sets of scan data from the switch multiplexed on the bus?

A Yes, it is.

MR. SCHNAYER: Objection to that question as calling for an opinion of this witness.

MR. HARDING: Q You indicated you had never seen a complete game of the OXO. My question is: Was the game that you gave to Mr. Johnson a complete game?

THE WITNESS: A. It was a complete game. The word "complete" I took to mean in the other context a finished game.

Q. Commercial game?

A. Commercial game.

MR. HARDING: That is all I have.

MR. SCHNAYER: I'd like to have some recross.

FURTHER EXAMINATION BY MR. SCHNAYER

MR. SCHNAYER: Q. I believe you answered a question before of everytime a ball goes down the play field, ejected on the play field and goes down and goes over some of the switches, then that would generate a strobe A, strobe B, strobe A, strobe B again; is that correct?

THE WITNESS: A. Yes.

Q. However, if the ball instead of going down through the eight switches at the bottom went through the switch light two, would that also generate a strobe A and Strobe B?

A. It could not get off the playing field without going through one of those eight switches even if it goes through two.

Q. So, what happens is after it goes through the two it goes back into the plunger; is that correct?

A. No. It proceeds on down the play field and has to go through one of the other eight switches.

Q. To your knowledge, when you have played the game has the time that it takes for the ball to go down the play field completely -- is that time always a constant?

A. No, it is not.

Q Why is it not a constant?

A. Because there are bumper posts that the ball can bounce off of. It can bounce off the sides. Various obstructions in the way will cause it to take longer times to get down the play field.

Q Is that how the game was designed to operate?

A. Yes.

MR. HARDING: I object to the last question. There has been no showing that this witness has had any hand whatsoever in the design of the OXO play field and game rules.

MR. SCHNAYER: Q What do you base that last answer on?

THE WITNESS: A. The fact that we were given that play field to work with.

Q Do you base it upon any other information?

A. Only from the pictures of the final game.

Q Was there ever any discussion with anybody that it was supposed to take the same time for the ball to go down the play field for every ball that was to be ejected onto the play field?

A. No, there was not.

Q When you stated before that the game was complete, did you mean it was complete such that it looked like the game that is depicted on GD228?

A. No. It was complete in that all of the functions depicted in that picture were present.

Q And the complete version of the game, what was the

difference between that complete version and the game that is depicted in GD228?

A. The back plate paneling was not present. The PC card that had the play lights, play matrix lights and credits and plays lights, there was no overlay over any of this section back here (indicating).

Q. That is the section that rises above the play field that has an OXO on it; is that correct?

A. Correct.

Q. Anything else?

A. Just the painting and stuff was not the same either. The colors were different.

Q. Did it have the same base?

A. Yes. The base was basically the same.

Q. Did it have a coin slot for coins to be put in the machine?

A. Yes, it did.

Q. Do you have any understanding as to whether the game was actually put into an establishment to see if it operated?

A. No, I don't.

Q. Did you ever hear any discussions regarding that matter?

A. No, I didn't.

MR. SCHNAYER: That concludes my examination.

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Bernie Kute
BERNIE KUTE

Subscribed and sworn to before me

this 24TH day of APRIL 1980

Sandra R. Miller.

Notary Public in and for the

County of SANTA CLARA

State of CALIFORNIA

OFFICIAL SEAL
SANDRA R. MILLER
NOTARY PUBLIC — CALIFORNIA
PRINCIPAL OFFICE IN THE
COUNTY OF SANTA CLARA
My Commission Expires October 18, 1980

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